LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the present application. Additions to existing claims are identified by underlining. Deletions to existing claims are indicated by ~~strikethrough~~ or [[double brackets]].

1. (Currently Amended) A method ~~of replicating content data stored on a central content server to at least one local content server,~~ comprising ~~the steps of~~:

determining unused bandwidth on a common link of an access data network carrying subscriber traffic and over which a [[the]] central content server located in a hub site and [[the]] at least one local content server located in a central office communicate; and

transmitting content data stored on the central content server to the at least one local content server substantially on the determined unused bandwidth;

transmitting the content data stored on the at least one local content server to at least one end user terminal proximate to the at least one local content server;

examining transmissions from the at least one end user terminal to distinguish transmission types;

forwarding each transmission of a first transmission type to a first network domain; and

forwarding each transmission of a second transmission type, different from the first transmission type, to a second network domain logically separate from the first network domain.

2. (Currently Amended) The method of claim 1, wherein said at least one local content server comprises a server located in the second network ~~a vertical services domain proximate to at least one end user terminal~~.

3. (Currently Amended) The method of claim 2, wherein the second network ~~vertical services~~ domain is located in a central office that provides Digital Subscriber Line (DSL) service to the at least one end user terminal.

4-6. (Cancelled)

7. (Currently Amended) The method of claim 1 [[6]], wherein the step of transmitting the content data stored on the at least one local content server to the at least one end user terminal comprises the steps of:

transmitting the content data stored on the at least one local content server to a data switch proximate to the at least one local content server;

integrating the content data transmitted from the at least one local content server with other data destined to the at least one end user terminal received at the data switch via the common link; and

distributing the integrated data from the data switch to a link to equipment of the at least one end user terminal via a multiplexer.

8. (Original) The method of claim 7, wherein the multiplexer is a Digital Subscriber Line Access Multiplexer (DSLAM).

9. (Currently Amended) A [[The]] method ~~of claim 6,~~ comprising:

determining unused bandwidth on a common link of an access data network carrying subscriber traffic and over which the central content server located in a hub site and the at least one local content server located in a central office communicate;

transmitting content data stored on the central content server to the at least one local content server substantially on the determined unused bandwidth;

storing the content data transmitted to the at least one local content server on the at least one local content server; and

transmitting the content data stored on the at least one local content server to at least one end user terminal proximate to the at least one local content server;

wherein the step of transmitting the content data stored on the at least one local content server to the at least one end user terminal proximate to the at least one local content server comprises the steps of:

provisioning a logical communication circuit extending from the at least one end user terminal through the network to a communication access node coupled to a first network domain,

at least a portion of the logical communication circuit extending through the common link, wherein the provisioning comprises defining the logical communication circuit in terms of a layer-2 protocol defining switched connectivity through the network;

at the data switch, examining communicated information in transmissions from the at least one end user terminal ~~customer premises~~, for a protocol encapsulated within said layer-2 protocol, to distinguish transmission types;

forwarding each detected transmission of a first transmission type from the data switch to the communication access node over the logical communication circuit defined in terms of the layer-2 protocol; and

forwarding each detected transmission of a second type, different from the first transmission type, to a second network domain logically separate from the first network domain, wherein the at least one local content server is coupled to the second network domain to receive at least one transmission of the [[a]] second type for control of the step of transmitting the content data stored on the at least one local content server to the at least one end user terminal proximate to the at least one local content server.

10. (Currently Amended) The [[A]] method as in claim 9, further comprising the steps of:

receiving first downstream transmissions intended for the at least one end user terminal at the data switch, over the logical communication circuit from the first network domain;

receiving second downstream transmissions intended for the at least one end user terminal from the second network domain at the data switch~~, content data from the at least one local content server~~, and

inserting the second downstream transmissions into the logical communication circuit, to combine the first and second downstream transmissions for communication over the logical communication circuit from the data switch to the at least one end user terminal.

11. (Currently Amended) The [[A]] method as in claim 10, wherein the logical communication circuit comprises an asynchronous transfer mode (ATM) permanent virtual circuit (PVC).

12. (Previously Presented) The method of claim 1, wherein a part of the bandwidth of the common link is reserved for transmitting the content data stored on the central content server to the at least one local content server to prevent the loss of a session between the central content server and the at least one local content server.

13. (Currently Amended) The method of claim 1, wherein the steps of determining unused bandwidth and transmitting the content data utilize priority and queuing in at least one node of the access data network, to implement a minimum bandwidth and provide additional bandwidth as available on the common link, for the transmitting of the content data over the common link.

14. (Currently Amended) The method of claim 1, wherein the steps of determining unused bandwidth and transmitting the content data implement a congestion mechanism to prevent data loss and utilize unused bandwidth.

15. (Original) The method of claim 14, wherein the congestion mechanism comprises Transmission Control Protocol (TCP).

16. (Original) The method of claim 1, wherein the transmitting step utilizes an unspecified bit rate service through the common link.

17. (Original) The method of claim 1, wherein the common link of the network also carries logical circuits for wide area data communications of a plurality end user terminals.

18.-24. (Cancelled)

25. (Currently Amended) An access data network, for providing access services to at least two different network domains, comprising:

a communication access node coupled to a first network domain;

a central content server located at a hub site for storing content data coupled to the communication access node;

a plurality of digital subscriber line transceivers coupled to network ends of subscriber lines, for data communication with transceivers coupled to customer premises end of respective subscriber lines;

an access switch coupled for data communication with the digital subscriber line transceivers, for receiving data from customer premises equipment via respective ones of the digital subscriber line transceivers and for supplying data intended for transmission to predetermined customer premises equipment to the respective ones of the digital subscriber line transceivers;

a high-speed data link between the access switch and the communication access node;

a layer-2 protocol logical communication circuit provisioned through the access switch and the high-speed data link for each subscriber line, wherein ~~each~~ the layer-2 protocol logical communication circuit is provisioned to extend from a respective customer premises to the communication access node;

a second network domain coupled locally to the access switch;

a local content server located in a central office for storing content data coupled to the second network domain; and

a logical communication circuit for content distribution between the central content server and the local content server provisioned through the access switch and the high-speed data link, the provisioning of the logical communication circuit for content distribution enabling communication of the content data between the communication access node and the access switch over bandwidth unused by traffic on the layer-2 protocol logical communication circuits.

26. (Currently Amended) The [[An]] access data network as in claim 25, further comprising:

a controller associated with the access switch, for examining communicated information in transmissions from the respective customer premises, for a protocol encapsulated within said layer-2 protocol, to distinguish transmission types, and in response to cause the switch to:

forward each detected transmission of a first transmission type to the communication access node over a respective one of the logical communication circuits defined in terms of the layer-2 protocol;

receive first downstream transmissions intended for one customer premises from the communication access node, over the [[a]] respective logical communication circuit;

receive second downstream transmissions intended for the one customer premises from the second network domain, wherein the content stored on the local content server is transmitted to the one customer premises over at least some of the second downstream transmissions; and

insert the second downstream transmissions into the respective one of the logical communication circuits, to combine the first and second downstream transmissions for transport via one of the digital subscriber line transceivers which serves the one customer premises.

27. (Currently Amended) The [[An]] access data network as in claim 26, wherein each of the logical communication circuits comprises an Asynchronous Transfer Mode (ATM) permanent virtual circuit (PVC).

28. (Currently Amended) The [[An]] access data network as in claim 26, wherein said controller comprises means for distinguishing between types of local area network protocol transmissions encapsulated within said layer-2 protocol.

29. (Currently Amended) The [[An]] access data network as in claim 28, wherein the first transmission type comprises a type of the local area network protocol adapted for internetwork service provider applications.

30. (Currently Amended) The [[An]] access network as in claim 29, wherein:

the local area network protocol comprises an Ethernet protocol, and

the first transmission type comprises point-to-point protocol over Ethernet.

31. (Currently Amended) The [[An]] access data network as in claim 25, wherein the access switch comprises a router.

32. (Currently Amended) The [[An]] access data network as in claim 25, wherein the access switch comprises a router.

33. (Currently Amended) The [[An]] access data network as in claim 25, wherein each of the logical communication circuits comprises a virtual circuit.

34. (Currently Amended) The [[An]] access data network as in claim 25, wherein the access switch comprises an Asynchronous Transfer Mode (ATM) switch.

35. (Currently Amended) The [[An]] access data network as in claim 25, wherein:

the digital subscriber line transceivers comprise asymmetrical digital subscriber line (ADSL) terminal units (ATUs);

the network further comprises a multiplexer providing data communications coupling between the ATUs and the access switch; and

the ATUs together with the multiplexer form a digital subscriber line access multiplexer (DSLAM).

36. (Currently Amended) The [[An]] access data network as in claim 25, wherein at least one of the digital subscriber line transceivers is adapted for communication over an optical link.

37. (Currently Amended) The [[An]] access data network as in claim 25, wherein at least one of the digital subscriber line transceivers is adapted for communications over a wireless link.

38. (Currently Amended) The [[An]] access data network as in claim 25, wherein at least one of the digital subscriber line transceivers is adapted for communication over a telephone line.

39. (Currently Amended) An access data network for providing a combination of wide area internetwork access service and vertical communication services, comprising:

a hub data switch connected to ~~a coupled to~~ the wide area internetwork;

a central content server located at a hub site coupled for data communication via the hub data switch;

a plurality of digital subscriber line transceivers coupled to network ends of subscriber lines, for data communication with transceivers coupled to customer premises ends of respective subscriber lines;

a multiplexer coupled to the digital subscriber line transceivers, for receiving data from customer premises equipment via respective ones of the digital subscriber line transceivers and for supplying data intended for transmission to predetermined customer premises equipment to the respective ones of the digital subscriber line transceivers;

an access switch coupled to the multiplexer;

a high-speed data link between the access switch and the hub data switch;

a vertical services network coupled locally to the access switch;

a local content server located at a central office coupled for data communications via the vertical services network; and

a logical circuit between the central content server and the local content server for transport of content data between the servers, wherein provisioning associated with the logical circuit in the hub data switch or in the access switch allocates otherwise available bandwidth to the logical circuit within the high-speed data link between the access switch and the hub data switch when not otherwise used ~~by the customer traffic~~.

40. (Currently Amended) The [[An]] access data network as in claim 39, wherein the logical circuit comprises at least one Asynchronous Transfer Mode (ATM) permanent virtual circuit (PVC).

41. (Currently Amended) The [[An]] access data network as in claim 40, wherein the at least one ATM PVC is provisioned to provide a guaranteed minimum bandwidth in combination with unspecified bit rate service for the logical circuit within the high-speed data link.

42. (Currently Amended) The [[An]] access data network as in claim 39, wherein the provisioning for the logical circuit in at least one of the access switch and the hub data switch defines a priority for the transport of content data between the servers to implement the

allocation of the otherwise available bandwidth to the logical circuit within the high-speed data link.

43. (Currently Amended) The [[An]] access data network 42, wherein the priority defined by the provisioning for the logical circuit in at least one of the access switch and the hub data switch also implements a minimum guaranteed bandwidth for the logical circuit within the high-speed data link.

44. (Currently Amended) The [[An]] access data network as in claim 39, further comprising:

a respective subscriber logical communication circuit provisioned in terms of a layer-2 routing protocol through the access switch and the high-speed data link, for each subscriber line to the subscriber to the hub data switch;

means associated with the access switch for examining communicated information in transmissions on the respective subscriber logical communication circuit from each respective customer premises, for protocol layers higher than the layer-2 routing protocol, to distinguish transmission types;

wherein:

the access switch routes each detected transmission of a first transmission type, received from a customer premises via the respective subscriber logical communication circuit on the respective line, over the respective subscriber logical communication circuit on the high-speed data link to the hub data switch, and

the access switch extracts each detected transmission of a type other than the first transmission type from the respective subscriber [[the]] logical communication circuit for routing to the vertical services network.

45. (Currently Amended) The [[An]] access data network as in claim 39, further comprising another vertical services network coupled locally to the hub data switch, wherein the central content server is coupled to the logical communication circuit via the other vertical services network and the hub data switch.

46. (Currently Amended) A method ~~of replicating content data stored on a central content server to at least one local content server,~~ comprising ~~the steps of~~:

determining unused bandwidth on a common link of an access data network carrying subscriber traffic and over which a central content server and [[the]] at least one local content server communicate;

transmitting content data stored on the central content server to the at least one local content server substantially on the determined unused bandwidth, the central content server and at least one local content server being part of a first network domain;

storing the content data transmitted to the at least one local content server on the at least one local content server; and

transmitting the content data stored on the at least one local content server to at least one end user terminal proximate to the at least one local content server, wherein the step of transmitting the content data stored on the at least one local content ~~second~~ server to the at least one end user terminal comprises the steps of:

transmitting the content data stored on the at least one local content ~~second~~ server to a data switch proximate to the at least one local content ~~second~~ server,

integrating the content data transmitted from the at least one local content ~~second~~ server with the other data received from a second network domain logically separate from the first network domain and destined to the at least one end user terminal received at the data switch via the common link, and

distributing the integrated data from the data switch to a link to equipment of the at least one end user terminal via a multiplexer.

examining transmissions from the at least one end user terminal to distinguish transmission types;

forwarding each transmission of a first transmission type to the first network domain; and

forwarding each transmission of a second transmission type, different from the first transmission type, to the second network domain.

47. (Previously Presented) The method of Claim 46 wherein the multiplexer is a Digital Subscriber Line Access Multiplexer (DSLAM).

48. (Currently Amended) A method of replicating content data stored on a central content server to at least one local content server, comprising the steps of:

determining unused bandwidth on a common link of an access data network carrying subscriber traffic and over which the central content server and the at least one local content server communicate;

transmitting content data stored on the central content server to the at least one local content server substantially on the determined unused bandwidth;

storing the content data transmitted to the at least one local content server on the at least one local content server;

transmitting the content data stored on the at least one local content server to at least one end user terminal proximate to the at least one local content server, wherein the step of transmitting the content data stored on the at least one local content server to the at least one end user terminal proximate to the at least one local content server comprises the steps of:

provisioning a logical communication circuit extending from the at least one end user terminal through the network to a communication access node coupled to a first network domain, at least a portion of the logical communication circuit extending through the common link, wherein the provisioning comprises defining the logical communication circuit in terms of a layer-2 protocol defining switched connectivity through the network;

at the data switch, examining communicated information in transmissions from the at least one end user terminal ~~customer premises~~, for a protocol encapsulated within said layer-2 protocol, to distinguish transmission types;

forwarding each detected transmission of a first transmission type from the data switch to the communication access node over the logical communication circuit defined in terms of the layer-2 protocol; and

forwarding each detected transmission of a second type, different from the first transmission type, to a second network domain logically separate from the first network domain, wherein the at least one local content server is coupled to the second network domain to receive at least one transmission of the [[a]] second type for control of the step

of transmitting the content data stored on the at least one local content server to at least one end user terminal proximate to the at least one local content server, and

receiving first downstream transmissions intended for the at least one end user terminal at the data switch, over the logical communication circuit from the first network domain;

receiving second downstream transmissions intended for the at least one end user terminal from the second network domain at the data switch, ~~content data from the at least one local content server~~; and

inserting the second downstream transmissions into the logical communication circuit, to combine the first and second downstream transmissions for communication over the logical communication circuit from the data switch to the at least one end user terminal.

49. (Currently Amended) The [[A]] method as in claim 48, wherein the logical communication circuit comprises an asynchronous transfer mode (ATM) permanent virtual circuit (PVC).

50. (Previously Presented) An access data network, for providing access services to at least two different network domains, comprising:

a communication access node coupled to a first network domain;

a central content server for storing content data coupled to the communication access node;

a plurality of digital subscriber line transceivers coupled to network ends of subscriber lines, for data communication with transceivers coupled to customer premises end of respective subscriber lines;

an access switch coupled for data communication with the digital subscriber line transceivers, for receiving data from customer premises equipment via respective ones of the digital subscriber line transceivers and for supplying data intended for transmission to predetermined customer premises equipment to the respective ones of the digital subscriber line transceivers;

a high-speed data link between the access switch and the communication access node;

a layer-2 protocol logical communication circuit provisioned through the access switch and the high-speed data link for each subscriber line, wherein the layer-2 protocol ~~each~~ logical

communication circuit is provisioned to extend from a respective customer premises to the communication access node;

a second network domain coupled locally to the access switch;

a local content server for storing content data coupled to the second network domain;

a logical communication circuit for content distribution between the central content server and the local content server provisioned through the access switch and the high-speed data link, the provisioning of the logical communication circuit for content distribution enabling communication of the content data between the communication access node and the access switch over bandwidth unused by traffic on the layer-2 protocol logical communication circuits;

a controller associated with the access switch, for examining communicated in transmissions from the respective customer premises for a protocol encapsulated within said layer-2 protocol, to distinguish transmission types, and in response to cause the switch to:

forward each detected transmission of a first transmission type to the communication access node over a respective one of the logical communication circuits defined in terms of the layer-2 protocol;

forward each detected transmission of a second type, different from the first transmission type, to the second network domain;

receive first downstream transmissions intended for one customer premises from the communication access node, over the [[a]] respective logical communication circuit;

receive second downstream transmissions intended for the one customer premises from the second network domain, wherein the content stored on the local content server is transmitted to the one customer premises over at least some of the second downstream transmissions; and

insert the second downstream transmissions into the respective logical communication circuit, to combine the first and second downstream transmissions for transport via one of the digital subscriber line transceivers which serves the one customer premises.

51. (Currently Amended) The [[An]] access data network as in claim 50, wherein each of the logical communication circuits comprises an Asynchronous Transfer Mode (ATM) permanent virtual circuit (PVC).

52. (Currently Amended) The [[An]] access data network as in claim 50, wherein said controller comprises means for distinguishing between types of local area network protocol transmissions encapsulated within said layer-2 protocol.

53. (Currently Amended) An access data network, for providing access services to at least two different network domains, comprising:

a communication access node coupled to a first network domain;

a central content server for storing content data coupled to the communication access node;

a plurality of digital subscriber line transceivers coupled to network ends of subscriber lines, for data communication with transceivers coupled to customer premises end of respective subscriber lines;

an access switch coupled for data communication with the digital subscriber line transceivers, for receiving data from customer premises equipment via respective ones of the digital subscriber line transceivers and for supplying data intended for transmission to predetermined customer premises equipment to the respective ones of the digital subscriber line transceivers;

a high-speed data link between the access switch and the communication access node;

a layer-2 protocol logical communication circuit provisioned through the access switch and the high-speed data link for each subscriber line, wherein each logical communication circuit is provisioned to extend from a respective customer premises to the communication access node;

a second network domain coupled locally to the access switch;

a local content server for storing the content data coupled to the second network domain; and

a logical communication circuit for content distribution between the central content server and the local content server provisioned through the access switch and the high-speed data link, the provisioning of the logical communication circuit for content distribution enabling communication of content data between the communication access node and the access switch over bandwidth unused by traffic on the layer-2 protocol logical communication circuits,

wherein the first transmission type comprises a type of the local area network protocol adapted for internetwork service provider applications.

54. (Currently Amended) The [[An]] access network as in claim 53, wherein:

the local area network protocol comprises an Ethernet protocol, and

the first transmission type comprises point-to-point protocol over Ethernet.

55. (Currently Amended) An access data network, for providing access services to at least two different network domains, comprising:

a communication access node coupled to a first network domain;

a central content server for storing content data coupled to the communication access node;

a plurality of digital subscriber line transceivers coupled to network ends of subscriber lines, for data communication with transceivers coupled to customer premises end of respective subscriber lines;

an access switch coupled for data communication with the digital subscriber line transceivers, for receiving data from customer premises equipment via respective ones of the digital subscriber line transceivers and for supplying data intended for transmission to predetermined customer premises equipment to the respective ones of the digital subscriber line transceivers;

a high-speed data link between the access switch and the communication access node;

a layer-2 protocol logical communication circuit provisioned through the access switch and the high-speed data link for each subscriber line, wherein each logical communication circuit is provisioned to extend from a respective customer premises to the communication access node;

a second network domain coupled locally to the access switch;

a local content server for storing content data coupled to the second network domain; and

a logical communication circuit for content distribution between the central content server and the local content server provisioned through the access switch and the high-speed data link, the provisioning of the logical communication circuit for the content distribution enabling communication of the content data between the communication access node and the access

switch over bandwidth unused by traffic on the layer-2 protocol logical communication circuits, wherein each provisioning of the logical communication circuit for the content distribution assigns unspecified bit rate service thereto with an associated minimum service guarantee.

56. (Previously Presented) An access data network, for providing a combination of wide area internetwork access service and vertical communication services, comprising:

a hub data switch connected to a coupling to the wide area internetwork;

a central content server coupled for data communication via the hub data switch;

a plurality of digital subscriber line transceivers coupled to network ends of subscriber lines, for data communication with transceivers coupled to customer premises ends of respective subscriber lines;

a multiplexer coupled to the digital subscriber line transceivers, for receiving data from customer premises equipment via respective ones of the digital subscriber line transceivers and for supplying data intended for transmission to predetermined customer premises equipment to the respective ones of the digital subscriber line transceivers;

an access switch coupled to the multiplexer;

a high-speed data link between the access switch and the hub data switch;

a vertical services network coupled locally to the access switch;

a local content server coupled for data communications via the vertical service network; and

a logical circuit between the central content server and the local content server for transport of content data between the servers, wherein provisioning associated with the logical circuit in the hub data switch or in the access switch allocates otherwise available bandwidth to the logical circuit within the high-speed data link between the access switch and the hub data switch when not otherwise used by customer traffic, wherein the logical circuit comprises

at least one Asynchronous Transfer Mode (ATM) permanent virtual circuit (PVC), wherein the at least one ATM PVC is provisioned to provide a guaranteed minimum bandwidth in combination with unspecified bit rate service for the logical circuit within the high-speed data link.

57. (Currently Amended) An access data network, for providing a combination of wide area internetwork access service and vertical communication services, comprising:

a hub data switch connected to a coupling to the wide area internetwork;

a central content server coupled for data communication via the hub data switch;

a plurality of digital subscriber line transceivers coupled to network ends of subscriber lines, for data communication with transceivers coupled to customer premises ends of respective subscriber lines;

a multiplexer coupled to the digital subscriber line transceivers, for receiving data from customer premises equipment via respective ones of the digital subscriber line transceivers and for supplying data intended for transmission to predetermined customer premises equipment to the respective ones of the digital subscriber line transceivers;

an access switch coupled to the multiplexer;

a high-speed data link between the access switch and the hub data switch;

a vertical services network coupled locally to the access switch;

a local content server coupled for data communications via the vertical service network;

a logical circuit between the central content server and the local content server for transport of content data between the servers, wherein provisioning associated with the logical circuit in the hub data switch or in the access switch allocates otherwise available bandwidth to the logical circuit within the high-speed data link between the access switch and the hub data switch when not otherwise used by customer traffic;

a respective subscriber logical communication circuit provisioned in terms of a layer-2 routing protocol through the access switch and the high-speed data link, for each subscriber line to the subscriber to the hub data switch;

means associated with the access switch for examining communicated information in transmissions on the respective subscriber logical communication circuit from each respective customer premises, for protocol layers higher than the layer-2 routing protocol, to distinguish transmission types;

wherein:

the access switch routes each detected transmission of a first transmission type, received from a customer premises via the respective subscriber logical communication circuit on the

respective line, over the respective subscriber logical communication circuit on the high-speed data link to the hub data switch, and

the access switch extracts each detected transmission of a type other than the first transmission type from the respective logical communication circuit for routing to the vertical services network.